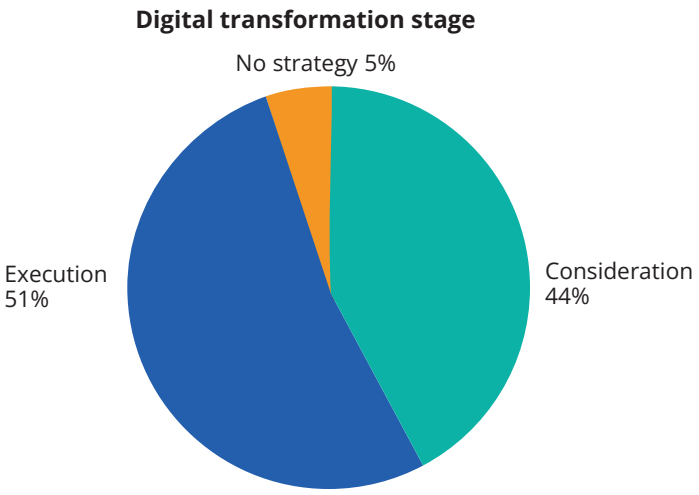
Thought Leadership
White Paper

Utilities 2023: Digital transformation and energy transition

Introduction

In the shift to more sustainable and renewable energy sources, digital strategies have become essential for utilities to ensure energy resilience and flexibility. Because energy markets are expected to remain volatile throughout 2023, prices will continue to fluctuate, and global natural gas supplies in particular will be under pressure. Although global renewable energy capacity has grown to almost 320 GW in 2022, according to the International Energy Agency, renewables today provide just 30% of total power required. Because there are limits to the amount of renewable energy sources that can be added to the power grid, digital technologies play a vital role in helping utilities achieve efficiency and decarbonize their operations.

Figure 1: About half of utilities are actively digitalizing[1]



Powering Business Worldwide

Digital transformation: utility sector dynamics

Digital transformation initiatives are not evenly spread across the utilities sector. Overall, more than half of utilities surveyed (51%) say they are executing a digital transformation strategy (see Figure 1). Diving deeper:

- Geographically, utilities in the United States are leading the way (79% in execution stage), almost two times the figure for the next closest region.
- Larger utilities are much more likely to take on transformation because they have more pressing requirements and likely staffing and budget advantages versus smaller peers (see sidebar, Transformation close-up).

Utilities digital priority: optimizing power and energy efficiency

Digital transformation initiatives in the utility sector are most often driven by a need to address energy and power efficiency (45%), the desire to optimize business processes (45%), to enable remote and hybrid work post-COVID-19 (43%), to better understand customer requirements (43%), and for ESG reporting (42%) (see Figure 2).

Drilling deeper, once again we see that the type, size and location of a utility informs its stage and goals of digital transformation.

- **Larger utilities** prioritize cutting operational costs, optimizing business processes and reducing risk — concerns driven by their scale and greater likelihood of in-market competitors.
- **Small and medium-sized utilities**, meanwhile, are more likely to be driven by improvements to supply chain and network capabilities, reflecting an emphasis on more basic operational needs.

Transformation close-up

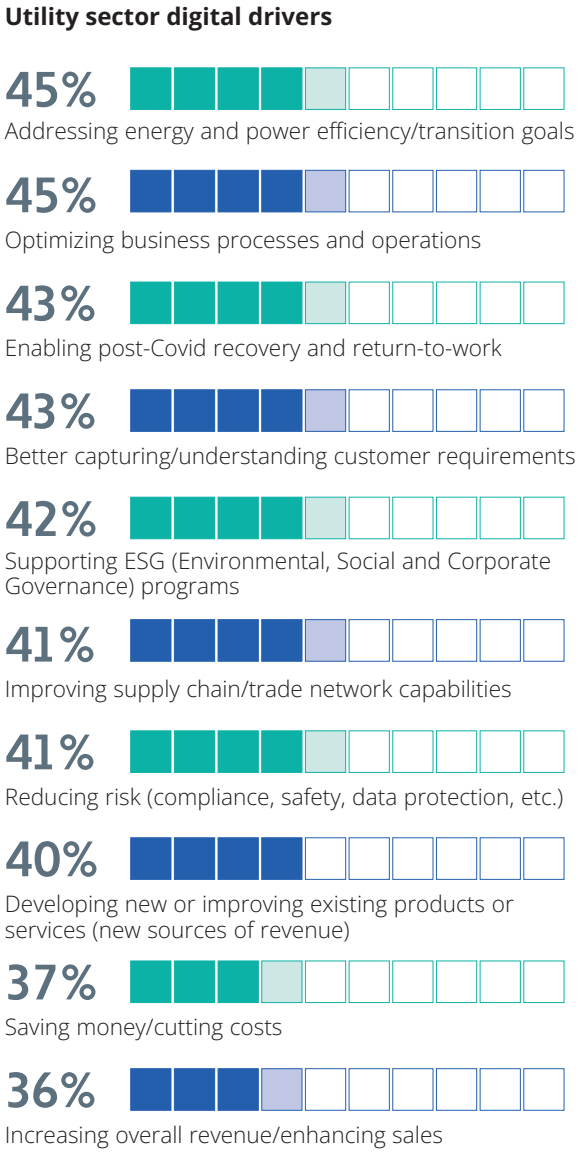
Percentage of respondents **executing** a digital transformation strategy:

Survey average: 51%

By geography:
- United States: 79%
- Europe & UK: 40%
- UAE: 40%
- Nordics: 36%

By utility size (all geographies):
- Small: 31%
- Medium-sized: 69%
- Large: 61%

Figure 2: Digital drivers are led by energy transition goals and process optimization[2]

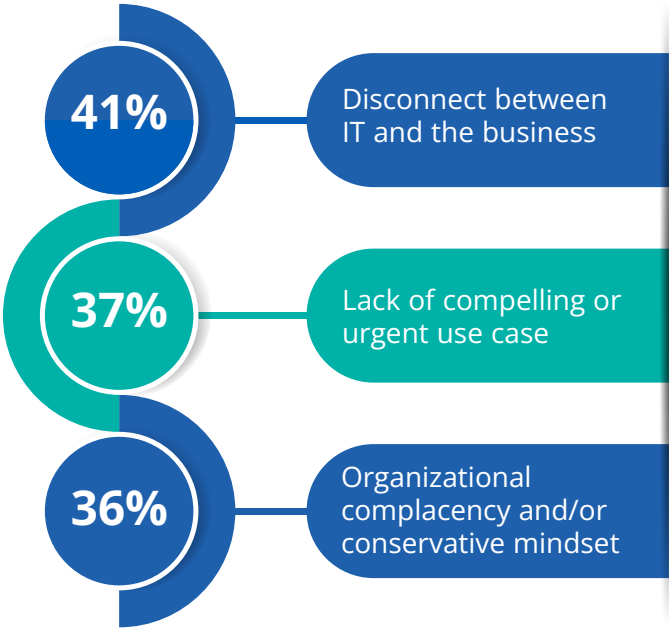


Utility challenges: managing digital change

Utilities of all sizes report similar challenges as they digitally transform, especially with overcoming business-as-usual issues. Those include realigning business groups — notably, operations and IT — to address digital goals, as well as overcoming a more conservative mindset in an industry that has only recently been deregulated in many locales (see Figure 3).

Figure 3: Disconnect between IT and the business represents the largest challenge to deploying digital utility initiatives[3]

Top three challenges to deploying digital utility initiatives



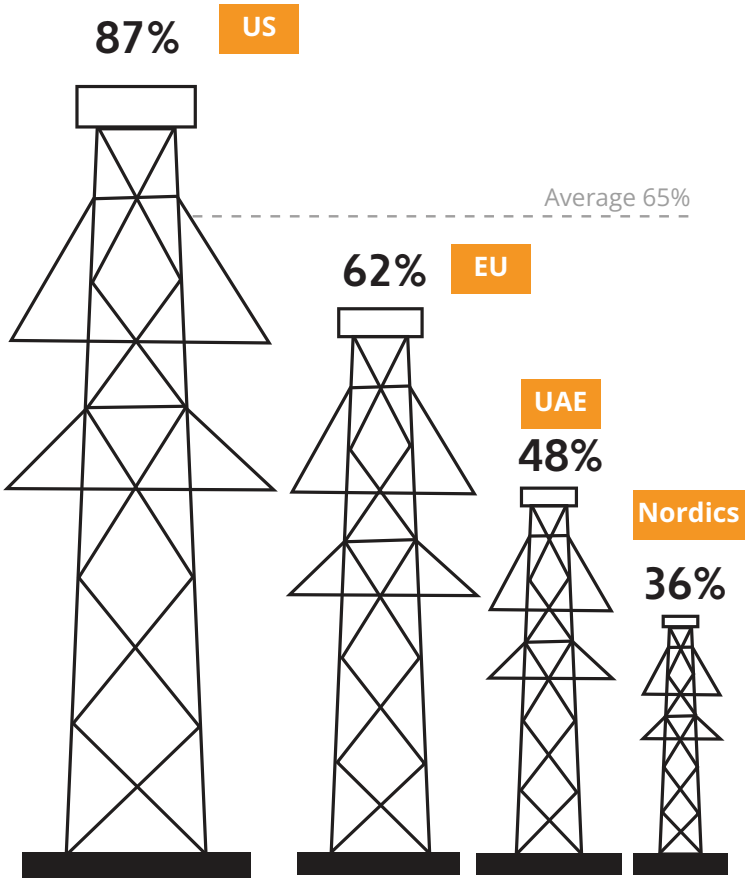
Beyond such cultural issues, the next-biggest global challenge is an overreliance on legacy utility technologies and processes (noted by 34% of respondents), resulting in utility infrastructure that is too limited or outdated to meet service demand. Drilling into service delivery challenges specifically, utilities in different geographies face unique challenges in delivering power service to customers.

- **US-based utilities** are most challenged to maintain grid stability while adding more distributed energy resources (51%), reflecting an operational environment undergoing significant structural changes.
- **European operators**, meanwhile, are most likely to cite overly siloed business units (42%) as their biggest service challenge, indicating a need for organizational change.
- **UAE utilities**, which often face fast-growing service demands, cite prioritizing investments in a rapidly changing business/service environment (48%) as their biggest challenge, such as Europe, the Middle East and Africa.

Technology adoption in the utility sector

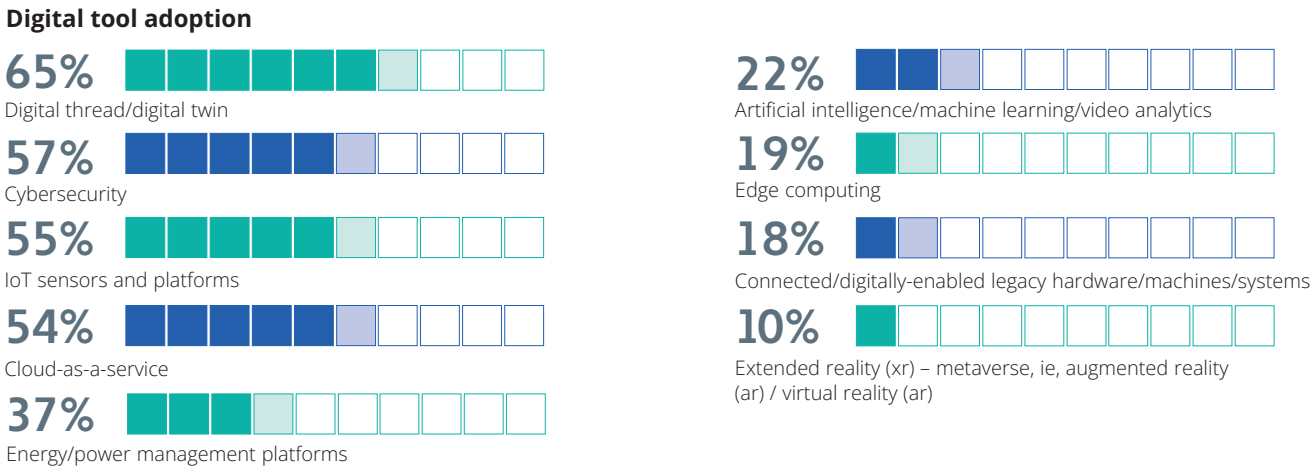
Utilities operate a one-of-a-kind business, so it is not surprising that they are also adopting digital technologies in unique ways. The most notable example is the sector's adoption of digital twins, which provide real-time, digital replicas of physical systems. These allow operators to monitor their far-ranging power networks and model changes to the infrastructure. Overall, 65% of utilities say they have adopted digital twins — in the US, that number rises to 87% (see Figure 4) — significantly outpacing even sectors that are closely associated with the technology such as manufacturing, which reports only 45% adoption of digital twins.

Figure 4: Digital twin adoption varies by geography[4]



The wide adoption of digital twins is a particular surprise as it outpaces other notable technology areas such as cybersecurity (57%), IoT sensors and platforms (55%) and cloud-as-a-service (54%). Those technologies are critical to shoring up grid resiliency and providing data insights to more proactively protect and manage the grid and to tie supply more closely to customer demand, respectively (see Figure 5). A preference for cloud and as-a-service approaches also indicates utilities' desire to simplify new technology deployments, adding and paying for capacity as they go.

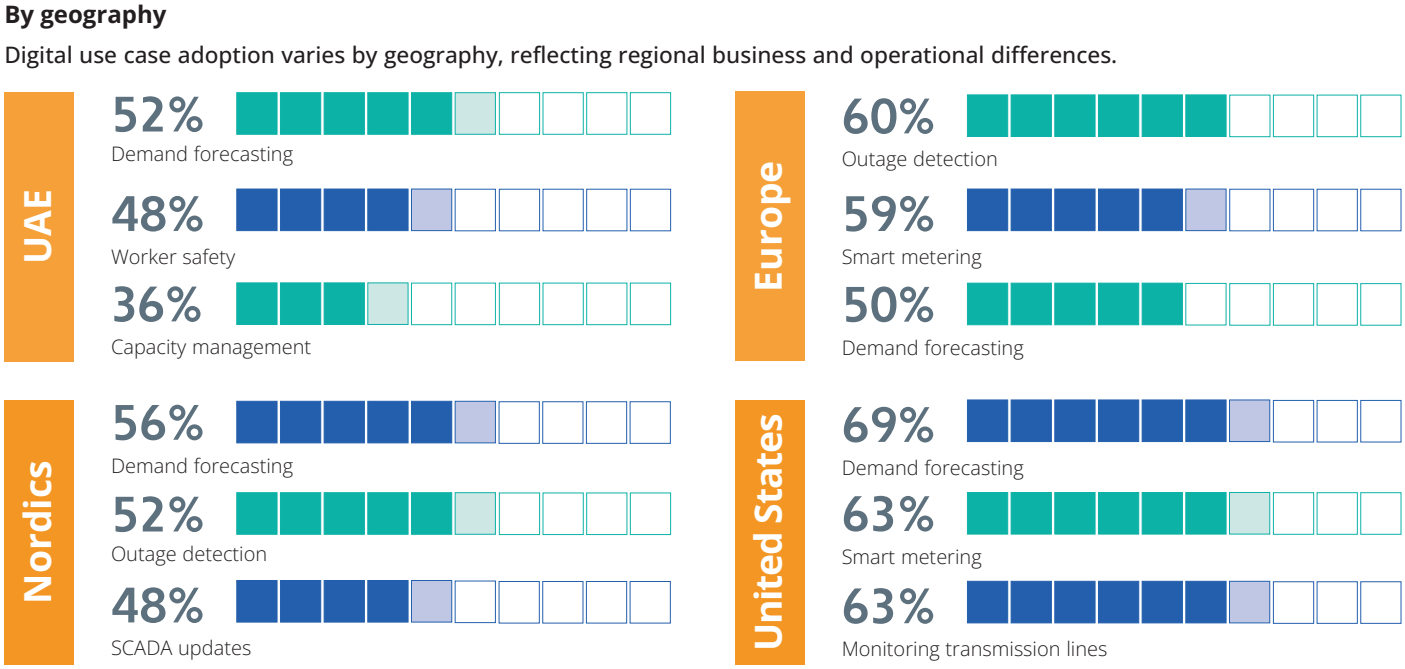
Figure 5: Digital technologies help utilities plan, manage and secure the power grid[5]



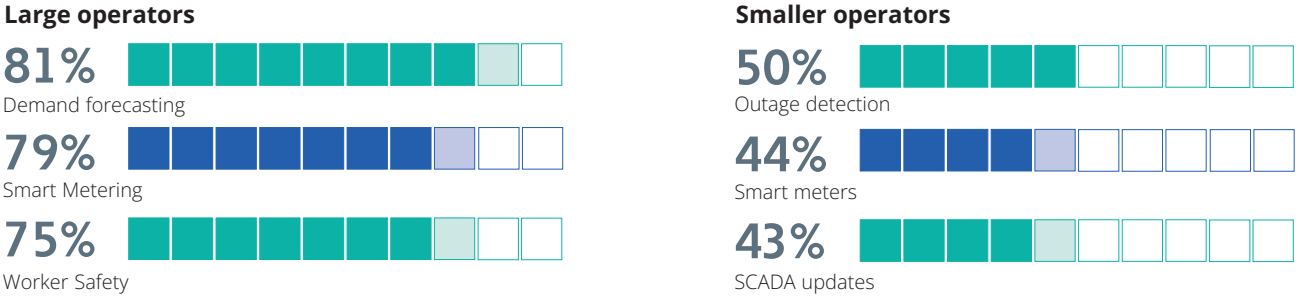
Digital use case priorities vary by utility size, geography

Digital technologies and processes ultimately help utilities deploy new applications and use cases. Better matching power supply against demand is the biggest priority, with demand forecasting/response the most-deployed digital use case (cited by 57% of respondents) and smart metering, which enables a clearer view into customer demand, coming in second at 55%. That said, use case adoption varies significantly by utility size and geography (see Figure 6), with larger providers more aggressive — and arguably more proactive than reactive to upcoming changes — in their deployments versus smaller operators.

Figure 6: Digital use case adoption varies by operator size, geography[6]



Large operators are more likely to deploy digital use cases and to prioritize demand/supply response versus small operators.

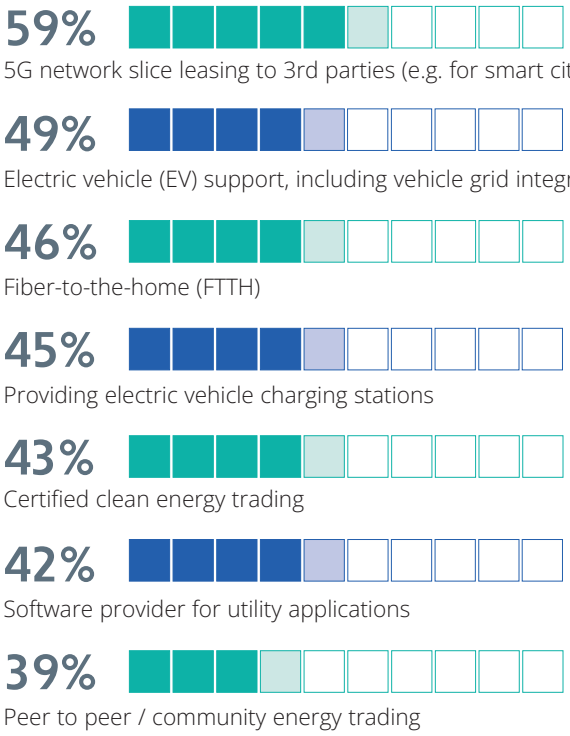


Digital transformation spawns new business models, revenue sources

Digital transformation by utilities may also result in new business models and new revenue streams — from selling industry-specific network slices to supporting electric vehicle charging needs to participating in energy trading scenarios (see Figure 7). As shown elsewhere, opportunities here are geography-specific, depending on factors including regional electric vehicle adoption, the status of grid modernization and the readiness of utilities to adapt to change.

Figure 7: Digital drives new revenue, business model opportunities [7 and 8]

Digitally enabled utility business models



New revenue opportunities by geography

5G network slicing

Leasing to third parties (average: 59%)

- US – 69%
- EU – 58%
- UAE – 52%
- Nordics – 44%

Energy trading

Certified clean energy trading (average: 43%)

- Nordics – 56%
- US – 43%
- EU – 43%
- UAE — 28%

EV support

Vehicle grid integration (average: 49%)

- Nordics – 56%
- US – 53%
- UAE – 52%
- EU — 44%

EV charging stations (average: 45%)

- UAE – 48%
- US – 48%
- EU – 44%
- Nordics – 40%

Footnotes

Chart data correlates to these questions from the survey conducted by 451 Research/S&P Global Market Intelligence.

1. Which of the following best describes the status of your organization's digital transformation strategy?
2. Which of the following are drivers to the adoption of digital transformation within your organization?
3. Which of the following are challenges to the adoption of digital transformation within your organization?
4. Which of the following technologies, tools or applications have you deployed or plan to deploy in the next 12 months to support your organization's digital transformation? (Digital twin/ Digital thread).
5. Which of the following technologies, tools, or applications have you deployed or plan to deploy in the next 12 months to support your organization's digital transformation?
6. Within your organization, which of the following digitally enabled use cases have you deployed today or plan to deploy in the next 12 months?
7. Where do you see additional revenue or business models developing in the next five years?

Methodology

This report is based on a commissioned web survey conducted in April and May 2022. The respondents were qualified based on their expertise in their organization's adoption of digital transformation. Respondent companies were from diverse industries and had 100+ full-time employees. Surveyed countries include the United States, United Kingdom, France, Germany, Spain, Italy, Nordic countries and UAE/Dubai. (Note that the base size for both the Nordics and UAE is less than n=30 so should be interpreted anecdotally.) Sample size for the utility companies in this study was 251. Total sample size for the study is 1,001.

Respondent roles fit into one of four eligible industry sectors: building services/facilities; datacenter owner/provider (including colocation and edge); manufacturing/industrial; and utilities. Survey invitations reached executives at the director level and above in IT, technology, facility operations, power management and environmental management job roles. Respondents were screened to be purchase decision-makers for embedded operations technology, having responsibility or connection in their role to operations technology for the site/facility. Their connection to operations technology could be either for IT or other mechanical operations. The survey was executed blindly — i.e., the survey sponsor name was not revealed to the participants at any stage of the project.

About S&P Global Market Intelligence

S&P Global Market Intelligence's Technology, Media and Telecommunications (TMT) Research provides essential insight into the pace and extent of digital transformation across the global TMT landscape. Through the 451 Research and Kagan products, TMT Research offers differentiated insight and data on adoption, innovation and disruption across the telecom, media and technology markets, backed by a global team of industry experts, and delivered via a range of syndicated research, consulting and go-to-market services, and live events.

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